that the book is likely to prove a useful one in institutions where brief courses in geology are taken by somewhat mature students.

The book perhaps departs as much and as satisfactorily from the text-books heretofore in use, in its treatment of the later parts of historical geology, as at any point. In his treatment of the Mesozoic and later periods, the author has brought together much data not heretofore incorporated in a text-book, and his handling of that difficult part of the subject is much more satisfactory than that found in most text-books of corresponding scope.

The illustrations in the volume are mainly new and attractive, many of them being reproductions from photographs direct. The illustrations of fossils seem to have been selected with great care, but are, on the whole, fewer in number than could have been wished.

The publishers have done their usual excellent work in the preparation of the volume. R. D. S.

Missouri Geological Survey, Vol. XI; Clay Deposits. By H. A. WHEELER. 622 pp., 39 pl. Jefferson City, 1896.

The eleventh volume issued by the Missouri Survey is well up to the standard of the previous work. It is a report of much more than local interest, and will doubtless become the standard book of reference for clay workers, filling a position analagous to that of the Manganese Report of the Arkansas Survey. The Missouri clay report is the most comprehensive work treating this subject issued by any American state since the New Jersey report of 1878. It monographs the subject of clays and clay working as exemplified in the wide range of deposits and processes in Missouri. It is written from the point of view of the engineer and treats of the different clays as adapted to various uses. Nevertheless there are many geological problems whose solution will be the easier for it. The large number of new analyses, as well as the careful tabulation of a wide range of older ones is alone a feature of great value. The physical tests, the studies of fusibility, plasticity, and shrinkage, aside from their immediate practical importance, may be used to advantage in studies of the origin of mountains and of mountain-making forces. Probably few portions of geology are less understood or more complex than that which relates to metamorphism, and in order to understand the nature of metamorphic rocks it is necessary to have something more than a general notion of the nature of the

metamorphosed material. This has been recognized so far as the petrology of igneous rocks is concerned but the petrology of the sedimentaries, being less inviting, has been largely neglected. It seems probable however that the field will eventually yield important results and certainly until it is better understood dicta regarding the metamorphism of sedimentary rocks must rest largely on assumption. Professor Wheeler's report was not undertaken with this point in view, and yet his results often have considerable bearing on the subject. His work will also, it is believed, prove helpful because of the methods of study and measurement which he has formulated.

To one not already familiar with the trade, the wide variety of products and the extent of the clay industry in Missouri, will doubtless come as a surprise, and yet among the most valuable portions of the report are the suggestions with regard to the expansion of the industry. If these be followed the state will soon receive returns many times in excess of the cost of the work. H. FOSTER BAIN.

The University Geological Survey of Kansas. By ERASMUS HAWORTH and Assistants. Vol. II, 318 pp. 25 plates. Topeka, 1897.

Under the direction of Professor Erasmus Haworth the University Geological Survey of Kansas has published a second volume upon the geology of that state. It is a companion and supplement to volume one, and covers the western half of the state as the former covered the eastern portion. It deals chiefly with the stratigraphy of the Upper Permian, Cretaceous and Tertiary formations, and while it affords much valuable information to the geologist it is written primarily for the citizens of the state. In the preparation of the volume Professor Haworth has enlisted the coöperation of Professor C. S. Prosser of Union College, Schenectady, N. Y., with his two assistants Mr. J. W. Beede and Mr. C. N. Gould, Professor S. Williston of the State University, and Mr. W. N. Logan. The report is illustrated with numerous half-tone reproductions from photographs, geologic sections and maps.

The first paper is on the "Physiography of Western Kansas" by E. Haworth. The drainage of the region as a whole is considered and the present drainage is compared with that of Tertiary time. Follow-